INDOOR AIR QUALITY ASSESSMENT

Department of Developmental Services
Berkshire Regional Office
333 East Street, 5th Floor
Pittsfield, MA

Prepared by:
Massachusetts Department of Public Health
Bureau of Environmental Health
Indoor Air Quality Program
September 2016

BACKGROUND

Building:	Department of Developmental Services
Address:	333 East Street, Pittsfield, MA
Assessment Requested by:	Kelly Flaherty, Division of Capital Asset Management and Maintenance (DCAMM)
Reason for Request:	Odors on the 5th floor during brick repointing
Date of Assessment:	August 31, 2016
Massachusetts Department of Public Health/Bureau of Environmental Health (MDPH/BEH) Staff Conducting Assessment:	Mike Feeney, Director, Indoor Air Quality (IAQ) Program
Date Building Constructed:	1950s
Building Description:	Constructed as a brick building that served as a nunnery for nursing trainees.
Building Population:	Approximately 20 employees

METHODS

Please refer to the IAQ Manual for methods, sampling procedures, and interpretation of results (MDPH, 2015).

RESULTS and DISCUSSION

The following is a summary of indoor air testing results (Table 1).

- ***Carbon dioxide*** levels were below the MDPH recommended level of 800 parts per million (ppm) in all but 2 areas surveyed, indicating adequate air exchange in most of the building.
- ***Temperature*** was within the MDPH recommended range of 70°F to 78°F in most occupied areas surveyed.

- ***Relative humidity*** was within the MDPH recommended range of 40 to 60% in most areas tested.
- ***Carbon monoxide*** levels were non-detectable (ND) in all areas tested.
- ***Particulate matter (PM2.5)*** concentrations measured were below the National Ambient Air Quality (NAAQS) level of 35 $\mu g/m^3$ in all areas tested.
- ***Volatile Organic Compounds*** concentrations were ND in all areas tested.

Ventilation

It is important to note that the building is not equipped with a functioning ventilation system. The sole source of ventilation in the building is openable windows. Air-conditioning (AC) is provided by window-mounted units. In an effort to reduce the impact of odors from the brick repointing, the window-mounted AC units were removed from the windows frames, which were then sealed with plastic. A number of offices were equipped with portable AC units (Picture 1) to provide temperature relief while windows were sealed.

Other IAQ Evaluations

The installation of the portable AC units coincided with the reports of odors inside the building. BEH IAQ staff noted that odors in the hallways seemed to originate from offices that did not have operating AC units. It appears the use of the portable AC units is causing depressurization (e.g., negative pressure), which draws odors from offices, storage space and the elevator shafts into the hallways and into offices with operating equipment. A number of different sources of odors were noted throughout the 5^{th} floor:

- Household cleaners;
- Plants;
- Personal care products;
- Desk cleaners;
- Hand sanitizers;
- Cooking odors from the microwave oven in the breakroom;
- Office supplies; and
- Hydraulic fluid from the elevator shaft.

All of these materials can produce odors that can be irritating to the eyes, nose and respiratory system.

CONCLUSIONS/RECOMMENDATIONS

A number of building conditions, described in this report, may contribute to odors. These conditions/issues combined with a lack of a mechanical ventilation system to filter air can play a role in causing odors described by building occupants. In order to reduce the migration of odors into DDS offices, a combination of providing a source of fresh air with a reduction/elimination of odor producing materials in offices/at the base of elevator shafts should be employed. Based on conditions observed at the time of assessment, the following recommendations are provided.

1. Install a fan with a filter in the hallway window at near the north elevator to direct fresh air indoors to *pressurize* the hallway.
2. Use a fan to direct air *towards* the north elevator to contain hydraulic fluid odor.
3. Ascertain if a second fan with filters can be installed in another exterior window on the 5th floor to provide additional pressurization.
4. Reduce/eliminate odorous products in office space.
5. Use methods outlined in the MA DPH document "Methods Used to Reduce/Prevent Exposure to Construction/Renovation Generated Pollutants in Occupied Buildings" which is included as Appendix A.
6. For buildings in New England, periods of low relative humidity during the winter are often unavoidable. Therefore, scrupulous cleaning practices should be adopted to minimize common indoor air contaminants whose irritant effects can be enhanced when the relative humidity is low.
7. Use a vacuum cleaner equipped with a high efficiency particulate arrestance (HEPA) filter in conjunction with wet wiping to remove dust from all surfaces. Avoid the use of feather dusters.
8. Consider reducing the number of plants. Indoor plants should be properly maintained and equipped with drip pans to prevent water damage to porous building materials and be located away from ventilation sources to prevent the aerosolization of dirt, pollen or mold.

9. Drinking water during the day can help ease some symptoms associated with a dry environment (throat and sinus irritations).
10. Refer to resource manual and other related indoor air quality documents located on the MDPH's website for further building-wide evaluations and advice on maintaining public buildings. These documents are available at http://mass.gov/dph/iaq.

REFERENCES

MDPH. 2015. Massachusetts Department of Public Health. “Indoor Air Quality Manual: Chapters I-III”. Available from http://www.mass.gov/eohhs/gov/departments/dph/programs/environmental-health/exposure-topics/iaq/iaq-manual/

Picture 1

Example of portable AC unit

Location: DDS Berkshire Regional Office

Address: 333 East St, 5th Floor, Pittsfield, MA

Table 1

Indoor Air Results

Date: 8/31/2016

Location	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)	Temp (°F)	Relative Humidity (%)	PM2.5 (µg/m^3)	TVOCs (ppm)	Occupants in Room	Windows Openable	Ventilation		Remarks
									Intake	Exhaust	
Background	398	ND	74	68	16	ND	0				
505	646	ND	78	47	8	ND	0	N	N	N	
506	619	ND	78	48	11	ND	0	N	N	N	
502	588	ND	77	47	5	ND	0	N	N	N	
504	580	ND	78	57	9	ND	0	N	N	N	
510	609	ND	79	52	10	ND	0	N	N	N	
507	541	ND	80	54	7	ND	0	N	N	N	
508	633	ND	79	51	18	ND	1	N	N	N	
509	620	ND	79	50	9	ND	0	N	N	N	
511	617	ND	77	54	7	ND	0	N	N	N	
512	570	ND	78	58	16	ND	0	N	N	N	
513	559	ND	78	53	12	ND	1	N	N	N	

AD = air deodorizer DO = door open µg/m^3= micrograms per cubic meter ND = non-detect ppm = parts per million

Comfort Guidelines

Carbon Dioxide:	< 800 ppm = preferred	Temperature:	70 - 78 °F
	> 800 ppm = indicative of ventilation problems	Relative Humidity:	40 - 60%

Location: DDS Berkshire Regional Office **Indoor Air Results**

Address: 333 East St, 5th Floor, Pittsfield, MA **Date: 8/31/2016**

Table 1 (continued)

Location	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)	Temp (°F)	Relative Humidity (%)	PM2.5 ($\mu g/m^3$)	TVOCs (ppm)	Occupants in Room	Windows Openable	Ventilation		Remarks
									Intake	Exhaust	
514	1018	ND	77	44	11	ND	0	N	N	N	
515	676	ND	74	69	16	ND	0	N	N	N	
517	673	ND	71	55	10	ND	0	N	N	N	
519	730	ND	74	58	14	ND	3	N	N	N	
520	607	ND	76	58	14	ND	0	N	N	N	
538	670	ND	75	57	11	ND	1	N	N	N	
521	671	ND	75	51	12	ND	2	N	N	N	
537	738	ND	76	54	12	ND	1	N	N	N	
522	685	ND	77	51	14	ND	1	N	N	N	
536	728	ND	76	48	23	ND	1	N	N	N	
523	722	ND	78	57	23	ND	0	N	N	N	
535	685	ND	76	47	13	ND	0	N	N	N	

Comfort Guidelines

Carbon Dioxide: < 600 ppm = preferred
600 - 800 ppm = acceptable
> 800 ppm = indicative of ventilation problems

Temperature: 70 - 78 °F
Relative Humidity: 40 - 60%

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Table 1 (continued)

Location	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)	Temp (°F)	Relative Humidity (%)	PM2.5 ($\mu g/m^3$)	TVOCs (ppm)	Occupants in Room	Windows Openable	Ventilation		Remarks
									Intake	Exhaust	
524	636	ND	78	57	26	ND	0	N	N	N	
534	637	ND	77	46	13	ND	0	N	N	N	
525	822	ND	74	44	13	ND	1	N	N	N	
520	747	ND	76	56	14	ND	1	N	N	N	
532	754	ND	75	46	9	ND	0	N	N	N	
530	704	ND	74	47	16	ND	0	N	N	N	
Reception	697	ND	75	52	12	ND	1	N	N	N	
Elevator	664	ND	77	60	14	ND	0	N	N	N	
Main hallway	689	ND	74	52	14	ND	0	N	N	N	

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